HILLSBOROUGH TOWNSHIP SCHOOL DISTRICT

SCIENCE CURRICULUM

ENVIRONMENTAL SCIENCE

AUGUST 2021

Environmental Science
Course Overview

The Environmental Science course of study is designed to prepare students for an active and conscientious participation in environmental matters that influence their daily lives and the quality of life on Earth. Students are exposed to the skills, knowledge, and attitudes needed to analyze environmental issues and evaluate solutions to environmental problems. This will be accomplished through class discussion, research, selected readings and laboratory work. The development of logical, problem solving techniques is an integral component of the course. The study of environmental science enables students to become active, educated participants in making decisions that affect the quality of their lives and the lives of all around them.

In Environmental Science, students examine factors that have influenced the distribution and development of human society; these factors include climate, natural resource availability, and natural disasters. Students use computational representations to analyze how Earth's systems and their relationships are being modified by human activity. Students also develop an understanding of how human activities affect natural resources and of the interdependence between humans and Earth's systems, which affect the availability of natural resources. Students will apply the design process to envision solutions to reduce human impacts on Earth's systems and improve social and environmental cost–benefit ratios.

Additionally, students study the interdependent relationships and dynamics in ecosystem, as well as functioning, resilience, and social interactions, including group behavior. Students use mathematical reasoning and models to make sense of carrying capacity, factors affecting biodiversity and populations, the cycling of matter and flow of energy through systems.

Students evaluate claims, analyze and interpret data, and develop and use models to explore the core ideas centered on the Earth's climate system. They use a quantitative model to describe how variations in the flow of energy into an out of the Earth's systems result in changes in climate, and how carbon is cycled through all of the Earth's spheres. They analyze geoscience data to make the claim that one change to Earth's surface can cause changes to other Earth systems, such as the climate system. Students analyze geoscience data and the results from global climate models to make an evidence based forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems.

The Environmental Science curriculum meets the requirements of the New Jersey Student Learning Standards for Science. It also helps to prepare students to exceed the standards assessed through NJ mandated state assessment by higher order application of various skills required for complete understanding of environmental science.

Hillsborough Township Public Schools
Environmental Science CP/H Curriculum

Unit Title	**Time Frame/Pacing**
The Current Environmental Situation	15 days

Phenomena/Anchoring Activity/Anchoring Question/Essential Questions

Anchoring Activity:

- Current environmental issues in the news
  - What does the term sustainability mean and do we even understand what that means for the products and resources that we use?
  - What is our individual impact on the Earth and the environment?
  - How do the actions of one generation affect future generations?
  - How do these needs/wants fit into the greater picture of what the environment provides to us?

Environmental Science CP/H Curriculum

- Humans impact the environment in many different ways.
- Understand the impact that our lifestyles and choices have on one another and the environment.
- Human impact can be global and local.
- Understand the conditions that lead to the overuse of a shared resource also known as the "tragedy of the commons."
- Current resources use can lead to a future of repeating negative environmental events.

NJ Standards/NGSS Performance Expectations Taught and Assessed
Students who demonstrate understanding can:

- HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.
- HS-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

3-Dimensional Learning Components

Science and Engineering Practices	**Disciplinary Core Ideas (DCI)**	**Crosscutting Concepts**
Engaging in Argument from Evidence • Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence,	**ESS3.A: Natural Resources** • Resource availability has guided the development of human society. (HS-ESS3-1)	• Cause and Effect • Systems and System Models • Stability and Change

and logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations). (HS-ESS3-2) **Analyzing and Interpreting Data** • Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. (HS-LS4-3)	• All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors. (HS-ESS3-2) **ESS3.B: Natural Hazards** • Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations. (HS-ESS3-1) **ETS1.B: Developing Possible Solutions** • When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (HS-ETS1-3) **LS4.D: Biodiversity and Humans** • Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by	

	preserving landscapes of recreational or inspirational value. (HS-LS4-6)	

Interdisciplinary Connections: Math, ELA, and Computer Science and Design Thinking

Math

- MP.2 Reason abstractly and quantitatively. (HS-ESS3-6)
- MP.4 Model with mathematics. (HS-ESS3-6)
- HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-ESS3-6)

ELA

- RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. (HS-LS2-5)

Computer Science and Design thinking

- 8.2.12.ETW.1 Evaluate ethical considerations regarding the sustainability of environmental resources that are used for the design, creation, and maintenance of a chosen product.
- 8.2.12.ETW.2 Synthesize and analyze data collected to monitor the effects of a technological product or system on the environment.

Career Readiness, Life Literacies, and Key Skills

- 9.1.12.CFR.2 Summarize causes important to you and compare organizations you seek to support to other organizations with similar missions.
- 9.1.12.CFR.3 Research companies with corporate governance policies supporting the common good and human rights.
- 9.1.12.EG.5 Relate a country's economic system of production and consumption to building personal wealth, the mindset of social comparison, and achieving societal responsibilities.
- 9.4.12.CI.1 Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
- 9.4.12.CT.4 Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that contribute to effective outcomes.
- 9.4.12.IML.5 Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2).
- 9.4.12.IML.6 Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).
- 9.4.12.IML.7 Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).

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Social-Emotional Learning Competencies		
• **Social Awareness:** Demonstrate an understanding of the need for mutual respect when viewpoints differ • **Responsible Decision Making:** Evaluate personal, ethical, safety, and civic impact of decisions		
Learning Targets	**Investigations/Resources**	**Formative Assessment**
Analyze the sustainability of everyday items based on environmental, economic, and social impact. Honors: Identify a current environmental issue in the news that is related to sustainability and propose solutions.	Sustainability Stations Activity Which is more sustainable? Sustainable Salsa activity	Do-Nows or Exit Tickets Question and answer/reflections Group/individual discussion
Resources we use	Discussion using their different objects about resources and sustainability → where do all of these resources come from (how do we get them? What do we do?) • What sphere do they belong to?	Do-Nows or Exit Tickets Question and answer/reflections Group/individual discussion
Instructional Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504)		
• Individual accommodations and modifications in students' IEP and 504's will be followed and adhered to. • Activities in this unit will be designed to allow the struggling learners to scaffold their learning and develop skills for working on larger activities by breaking down tasks. All students will be given opportunities to use different learning modalities to advance their understanding using varied strategies that accentuate their own learning style. Gifted learners will have the opportunity to challenge their problem solving skills by asking more complex questions and exploring concepts in greater depth.		
Common Assessment(s)	**Assessment Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504)**	
• (NEW) Sustainability options: Giving two different objects where they must choose which is more sustainable and support using the CER framework graphic organizer (rubric grading)	• All assessments will be modified in accordance with specifications outlined in each student's individual educational plans and 504s. This may include, but is not limited to, extra time, clarification of questions, reading questions aloud, word banks, oral responses and alternate testing sites.	

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Unit Title	**Time Frame/Pacing**
The Environment's Natural Operation	46 days

Phenomena/Anchoring Activity/Anchoring Question/Essential Questions

- How does the environment operate naturally to provide the resources needed for a variety of organisms to live there?
- How are energy and matter transferred and transformed in an ecosystem?
- How do ecosystems establish themselves and how do they recover if disturbed?
- How is energy and matter cycled and conserved on Earth? How are organisms dependent on each other?

Phenomena:

- Ecosystem functions → There are more prey than predators. "I see more squirrels than foxes in Hillsborough."
- Classroom ecosystems→ Ecosystem in a jar
- Photosynthesis/Cellular Respiration → Their own classroom ecosystems
- Human Population Video-over time.

Enduring Understandings

- Ecosystem Functions → Ecosystems are complex systems where varieties of abiotic and biotic factors interact and work toward balance in order to be healthy and sustainable.
- Energy Transfer → Energy moves through an ecosystem. Starts from the sun and moves through the consumption, heat, and other bodily functions. Plants use photosynthesis to make their own food and then use cellular respiration in order to break down their food to gain energy. Energy moves through all four spheres.
- Carrying Capacity → a population can grow exponentially until the resources of the ecosystem limit the growth of the population - an ecosystem can support a certain # of organisms due to the amount of resources available -some organisms can grow at a larger rate then other -an ecosystem can change due to certain species interactions, but the ecosystem can return to its original form depending on the scale of the change.
- The more nutrients and energy available in an ecosystem allows for the presence of more organisms thus increasing the biodiversity of an area.
- Carbon Cycle → The carbon cycle moves carbon within all the spheres and has been since Earth's creation.
- The more nutrients and energy available in an ecosystem allows for the presence of more organisms thus increasing the biodiversity of an area.

NJ Standards/NGSS Performance Expectations Taught and Assessed
Students who demonstrate understanding can:

- HS-LS2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

- HS-LS2-2 Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and population in ecosystems of different scales.
- HS-LS2-4 Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
- HS-LS2-5 Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
- HS-LS2-6 Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions. may result in a new ecosystem.
- HS-LS2-8 Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

3-Dimensional Learning Components

Science and Engineering Practices	Disciplinary Core Ideas (DCI)	Crosscutting Concepts
Constructing Explanations and Designing Solutions • Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS4-2), (HS LS4-4) **Analyzing and Interpreting Data** • Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. (HS-LS4-3)	**LS2.A: Interdependent Relationships in Ecosystems** • Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. (HS-LS2-1), (HS-LS2-2) **LS2.B: Cycles of Matter and Energy** • Transfer in Ecosystems Plants or algae form the lowest level of the food web. At each link upward in a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in	• Systems and System Models • Stability and Change • Patterns • Cause and Effect • Energy and Matter

	cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly made structures, and much is discarded. The chemical elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved. (HS LS2-4) **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** • A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. (HS LS2-2), (HS-LS2-6) **PS3.D: Energy in Chemical Processes** • The main way that solar energy is captured and stored on Earth is through the complex chemical process known as photosynthesis.	

	(secondary to HS-LS2-5)	

Interdisciplinary Connections: Math, ELA, and Computer Science and Design Thinking

Math

- MP.2 Reason abstractly and quantitatively. (HS-LS2-1), (HS-LS2-2), (HS-LS2-4), (HS-LS2-6)
- MP.4 Model with mathematics. (HS-LS2-1), (HS-LS2-2), (HS-LS2- 4)
- HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HSLS2-1), (HS-LS2-2), (HS-LS2-4)
- HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-1), (HS-LS2-2), (HS-LS2-4)
- HSS-IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population. (HS-LS2-6)

ELA

- RST.9-10.8 Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. (HS-LS2-6), (HS-LS2-8)
- RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS2-1), (HS-LS2-2), (HS-LS2- 3), (HS-LS2-6), (HS-LS2-8)
- RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. (HS-LS2-6), (HS-LS2-8)

Computer Science and Design Thinking

- 8.1.12.CS.2 Model interactions between application software, system software, and hardware.
- 8.1.12.IC.2 Test and refine computational artifacts to reduce bias and equity deficits.
- 8.1.12.DA.1 Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
- 8.1.12.DA.5 Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

Career Readiness, Life Literacies, and Key Skills

- 9.1.12.CFR.2 Summarize causes important to you and compare organizations you seek to support to other organizations with similar missions.
- 9.1.12.CFR.3 Research companies with corporate governance policies supporting the common good and human rights.
- 9.1.12.EG.5 Relate a country's economic system of production and consumption to building personal wealth, the mindset of social comparison, and achieving societal responsibilities.
- 9.4.12.CI.1 Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a).
- 9.4.12.CT.4 Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that

contribute to effective outcomes.

- 9.4.12.IML.5 Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2).
- 9.4.12.IML.6 Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).
- 9.4.12.IML.7 Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).

Social-Emotional Learning Competencies

- **Self Management:** Recognize the skills needed to establish and achieve personal and educational goals.
- **Social Awareness:** Demonstrate an understanding of the need for mutual respect when viewpoints differ.
- **Responsible Decision-Making:** Evaluate personal, ethical, safety, and civic impact of decisions.
- **Relationship Skills:** Identify who, when, shwere, or how to seek help for oneself or others when needed.

Learning Targets	Investigations/Resources	Formative Assessment
How ecosystems function under natural circumstances.	Outdoor exploration: • What is abiotic/biotic? Create lists as a class . As a group can you categorize something from each group/individual? • Connection circles Classroom ecosystems: • Create small ecosystems that incorporate all 4 spheres and how they depend on each other. • Greater biodiversity, healthier the system	• Do-Nows or Exit Tickets • Question and answer/reflections • Group/individual discussion
Understand how energy flows through an ecosystem Honors Only: How does the amount of CO2, amount of sunlight, and wavelength influence the rate of photosynthesis?	Photosynthesis/Cellular Respiration • Energy starts with the sun Food webs/trophic levels • Increases and decreases of populations in an ecosystem can change how an ecosystem functions for populations and individuals. Carbon in the tree activity	• Do-Nows or Exit Tickets • Question and answer/reflections • Group/individual discussion

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How do aquatic plants maximize photosynthesis underwater?	Carrying capacity activities • What Explains What Has Been Happening to Big Animals in the Serengeti?	
Understand how matter flows through an ecosystem Honors Only: Inclusion of discussion of the nitrogen cycle as well.	Carbon Cycle • Creating a large scale class model of the parts of the carbon cycle that have happened so far. ○ Photosynthesis/Cellular Respiration/Decomposition focused	• Do-Nows or Exit Tickets • Question and answer/reflections • Group/individual discussion
Honors Only: Increases in various populations puts pressure on the functioning of an ecosystem, however, social interactions and group behavior can increase that change of survival for individuals. There are different symbiotic relationships between organisms in an ecosystem.		

Instructional Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504) when appropriate

- Individual accommodations and modifications in students' IEP and 504's will be followed and adhered to.
- Activities in this unit will be designed to allow the struggling learners to scaffold their learning and develop skills for working on larger activities by breaking down tasks. All students will be given opportunities to use different learning modalities to advance their understanding using varied strategies that accentuate their own learning style. Gifted learners will have the opportunity to challenge their problem solving skills by asking more complex questions and exploring concepts in greater depth.

Common Assessment(s)	**Assessment Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504)**
• Ecosystem • Food Web Diagram	• All assessments will be modified in accordance with specifications from CST as enumerated in each student's individual educational plans and 504s. This may include, but is not limited to, extra time, clarification of questions, reading questions aloud, word banks, oral responses and alternate testing sites.

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Unit Title	**Time Frame/Pacing**
Humans in the Wild	47 days

Phenomena/Anchoring Activity/Anchoring Question/Essential Questions

Essential Question:

- How have human activities impacted biodiversity and the environment? How can we mitigate these impacts?
  Phenomena:
  - Yellowstone Wolves: How can a wolf shape a river?
  - Endangered Species: List of Special Concerns just in NJ
  - Floodplain Models: Hillsborough flooding (kohls before and after) → possible flood gauge(older areas -- > pond), Picture Texas Harvey

Essential Question:

- How can we support a growing human population sustainably? How can we obtain and utilize resources more sustainably?
  Phenomena:
  - Ingesting Plastic/Biomagnification: Infographic on Plastic Ingested over time
  - Great Pacific Garbage Patch: "We Can Recycle Plastic"
  - How a Plastic Bottle is Made

Enduring Understandings

- Humans can have both positive and negative impacts on the environment.
- Humans need ecosystems for energy and other resources.
- Humans tend to overexploit resources for personal benefit that lead to social, economical, and environmental costs.

NJ Standards/NGSS Performance Expectations Taught and Assessed
Students who demonstrate understanding can:

- HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- HS-LS4-6 Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

3-Dimensional Learning Components

Science and Engineering Practices	**Disciplinary Core Ideas (DCI)**	**Crosscutting Concepts**
Using Mathematics and Computational Thinking	**LS2.C: Ecosystem Dynamics, Functioning, and**	• Cause and Effect

Constructing Explanations and Designing Solutions	**Resilience** • Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. (HS-LS2-7) **LS4.D: Biodiversity and Humans** • Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). *(secondary to HS-LS2-7)* • Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. *(secondary to HS-LS2-7) (Note: This Disciplinary Core Idea is also addressed by HS-LS4-6.)* **ETS1.B: Developing Possible Solutions**	• Stability and Change

	• When evaluating solutions it is important to take into account a range of constraints including cost, safety, reliability and aesthetics and to consider social, cultural and environmental impacts. *(secondary to HS-LS2-7)*	

Interdisciplinary Connections: Math, ELA, and Computer Science and Design Thinking

Math

- MP.2 Reason abstractly and quantitatively. (HS-LS2-1), (HS-LS2-2), (HS-LS2-6), (HS-LS2-7)
- HSN.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-LS2-1), (HS-LS2-2), (HS-LS2-4), (HS-LS2-7)
- HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-1), (HS-LS2-2), (HS-LS2-7)
- HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-1), (HS-LS2-2), (HS-LS2-7)

ELA

- RST.9-10.8 Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. (HS-LS2-6), (HS-LS2-7), (HS-LS2-8)
- RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. (HS-LS2-6), (HS-LS2-7), (HS-LS2-8)
- RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. (HS-LS2-6), (HS-LS2-7), (HS-LS2-8)
- WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-LS4-6)
- WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-LS2-7), (HS-LS4-6)

Computer Science and Design Thinking

- 8.1.12.CS.2 Model interactions between application software, system software, and hardware
- 8.1.12.IC.2 Test and refine computational artifacts to reduce bias and equity deficits
- 8.1.12.DA.1 Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
- 8.1.12.DA.5 Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

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Career Readiness, Life Literacies, and Key Skills
• 9.1.12.CFR.2 Summarize causes important to you and compare organizations you seek to support to other organizations with similar missions. • 9.1.12.CFR.3 Research companies with corporate governance policies supporting the common good and human rights. • 9.1.12.EG.5 Relate a country's economic system of production and consumption to building personal wealth, the mindset of social comparison, and achieving societal responsibilities. • 9.4.12.CI.1 Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). • 9.4.12.CT.4 Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that contribute to effective outcomes. • 9.4.12.IML.5 Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2). • 9.4.12.IML.6 Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5). • 9.4.12.IML.7 Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).
Social-Emotional Learning Competencies
• **Relationship Skills:** Utilize positive communication and social skills to interact effectively with others.

Learning Targets	**Investigations/Resources**	**Formative Assessment**
Explain the impact humans can have on the function of an ecosystem(positive and negative). Evaluate a solution for how humans have restored an ecosystem to its pre-human conditions.	Yellowstone food web → How can a wolf shape a river? Gizmos Ecosystem STEM Case → supplemental resource for Yellowstone Wolves	How can a horseshoe crab save a bird? DDT and bald eagles Do-Nows or Exit Tickets Question and answer/reflections Group/individual discussion
Explain how human activities have impacted biodiversity. Design solutions to mitigate the impacts of human activities on biodiversity.	List of Special Concerns just in NJ 5 different species impacted by different things (habitat destruction - Diamondback terrapin , pollution- amphibian, invasive species - etc) - For habitat destruction, WHY are they	Develop solutions for recovery of endangered populations Do-Nows or Exit Tickets Question and answer/reflections

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	losing their habitat? What happened to its habitat? - Solutions and significance of that species(niche) - Speed dating activity - Why are some organisms targeted for conservation over others? (society/economic)	Group/individual discussion
Design a solution to mitigate the impacts of human activities on stormwater runoff.	Floodplain model • Map of Hillsborough (larger) to have them pin their areas • Still have them design solutions for ideas of how to fix this • Philly ideas with rainwater • Sprinkles to help lead into microplastics (jimmy's)	Human Impact on Permeability of Surfaces using Floodplain Model Do-Nows or Exit Tickets Question and answer/reflections Group/individual discussion
Explain how human use of plastic resources impacts the environment and ourselves through our consumption of microplastics.	Infographic on Plastic Ingested over time Microplastics → how they get there, what they are, how do they impact the ecosystem • Legos (give them legos) → how are you related to this lego? River Finder--How does water move across land? Phenomena: Great Pacific Garbage Patch "We Can Recycle Plastic" - How plastic is traditionally "recycled" and a new way to recycle plastic	Do-Nows or Exit Tickets Question and answer/reflections Group/individual discussion
Demonstrate understanding that the production of our resources uses a lot of our natural resource.s	Phenomena: DiagramHow Plastic is Made Discussion: How does production utilize energy and natural resources? (making plastics from natural resources)	Do-Nows or Exit Tickets Question and answer/reflections Group/individual discussion

Honors: Develop an investigation of personal practices regarding solid waste management and evaluate the mitigating effects of making any change to current behaviors.		

Instructional Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504) When Appropriate

- Individual accommodations and modifications in students' IEP and 504's will be followed and adhered to.
- Activities in this unit will be designed to allow the struggling learners to scaffold their learning and develop skills for working on larger activities by breaking down tasks. All students will be given opportunities to use different learning modalities to advance their understanding using varied strategies that accentuate their own learning style. Gifted learners will have the opportunity to challenge their problem solving skills by asking more complex questions and exploring concepts in greater depth.

Common Assessment(s)	**Assessment Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504)When Appropriate**
• (New) Human impact on ecosystem: • Floodplain Models (Summative)	• All assessments will be modified in accordance with specifications from CST as enumerated in each student's individual educational plans and 504s. This may include, but is not limited to, extra time, clarification of questions, reading questions aloud, word banks, oral responses and alternate testing sites.

Hillsborough Township Public Schools
Environmental Science CP/H Curriculum

Unit Title	**Time Frame/Pacing**
A Changing Climate	47 days

Phenomena/Anchoring Activity/Anchoring Question/Essential Questions

Phenomenon:

- Data showing temperature trend with carbon dioxide trends (correlation between the change in temperature and the change in carbon dioxide)
- Increase snow graph trend (raising awareness that climate change does not just mean an increase in temperature)
- A wind turbine not generating electricity (helping to analyze where certain energies are good to use, how to choose these energy source, and knowing what the options out there are)
- Increase snow graph trend (raising awareness that climate change does not just mean an increase in temperature)
- Honors: Ocean Predator's Travel Patterns in the Pacific Ocean
- Honors: Disappearance of the Golden Toad of Costa Rica:(Climate Change)

Essential Questions:

- How does Earth's location and positioning within our solar system with respect to the Sun influence the absorption and reflection of the Sun's energy?
- How does the location on Earth's surface, weather conditions or type of surface influence energy transfer?
- How have human activities altered energy transfer on Earth?
- How does nutrient cycling impact climate?
- How has the Earth's atmosphere developed and varied over time?
- How have humans and natural processes altered Earth over time?

Enduring Understandings

- Energy can be generated from renewable and non-renewable resources.
- Carbon cycles within the 4 spheres of the Earth.
- Carbon Dioxide is a greenhouse gas that contributes to the warming of our atmosphere.
- We can reverse global warming and the Earth's soil is the solution.
- Greenhouse gases absorb heat and result in an increase in the global temperature.
- The atmosphere is made up of different gases in small percentages which are also greenhouse gases.
- Greenhouse gas additions in the environment come mainly from human processes of combustion of fossil fuels.
- There are a variety of solutions to use in order to prevent future destruction but they all come with their own negatives.
- Humans impact the environment in many different ways.
- Human impact can be global and local.

- Fixing human impact can be extremely difficult, but it needs to be done with consideration of social, economical, and environmental costs and benefits.

NJ Standards/NGSS Performance Expectations Taught and Assessed
Students who demonstrate understanding can:

- HS-ESS2-4 Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
- HS-ESS2-7 Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.
- HS-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
- HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.
- HS-ESS3-5 Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current of global or regional climate change and associated future impacts to Earth systems.
- HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).
- HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- HS-LS4-6 Create or revise a simulation to mitigate adverse impacts of human activity on biodiversity.
- HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

3-Dimensional Learning Components

Science and Engineering Practices	Disciplinary Core Ideas (DCI)	Crosscutting Concepts
Developing and Using Models • Use a model to provide mechanistic accounts of phenomena. **Constructing Explanations and Designing Solutions** • Design, evaluate, and refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and trade off considerations. • Design or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of	**ESS2.D.4: Weather and Climate** • Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (secondary to HS-ESS3-6) **ESS2D.1: Weather and Climate** • The foundation for Earth's global climate	**Cause and Effect** • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. **Stability and Change** • Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. • Feedback (negative or positive) can stabilize or destabilize a system. • Much of science deals with constructing

evidence, prioritized criteria, and tradeoff considerations.

Analyzing and Interpreting Data

- Analyze data using computational models in order to make valid and reliable scientific claims.

Using Mathematics and Computational Thinking

- Use a computational representation of phenomena or design solutions to describe and/or support claims and/or explanations.
- Use mathematical representations of phenomena or design solutions to support claims.

systems is the electromagnetic radiation from the sun, as well as its reflection, absorption, storage, and redistribution among the atmosphere, ocean, and land systems, and this energy's radiation into space. (HS-ESS2D.3)

- Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect climate. (HS-ESS2- 6), (HS-ESS2-4)

ESS3C.2: Human Impact on Earth Systems

- Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. (HS-ESS3-4)

ESS3D.1: Global Climate Change

- Though the magnitudes of human impacts are greater than they have ever been, so too are human abilities to model, predict, and manage current and future impacts. (HS-ESS3-5)

LS2C.1: Ecosystem Dynamics, Functioning, and Resilience

- A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to

explanations of how things change and how they remain stable.

Systems and System Models

- When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models.

Patterns

- Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. (HS-LS4-1), (HS-LS4-3)

	becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. (HS-LS2-2), (HS-LS2-6) **ETS1B.1: Developing Possible Solutions** • When evaluating solutions it is important to take into account a range of constraints including cost, safety, reliability and aesthetics and to consider social, cultural and environmental impacts. (secondary to HS-LS2-7) **ESS3D.2: Global Climate Change** • Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities. (HS-ESS3-6) **ESS3C.1: Human Impacts on Earth Systems** • The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. (HS-ESS3-3) **ESS3C.2: Human Impacts on EArth Systems** • Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. (HS-ESS3-4)	

	LS2.B: Cycles of Matter and Energy Transfer in Ecosystems • Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geologic, and biological processes. (HS-LS2-5)	

Interdisciplinary Connections: Math, ELA, and Computer Science and Design Thinking

Math

- MP.2 Reason abstractly and quantitatively.
- MP.4 Model with mathematics.

ELA

- RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
- RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
- RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

Computer Science and Design Thinking

- 8.2.12.ETW.3 Identify a complex, global environmental or climate change issue, develop a systematic plan of investigation, and propose an innovative sustainable solution.
- 8.2.12.ETW.4 Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints.

Career Readiness, Life Literacies, and Key Skills

- 9.1.12.CFR.2 Summarize causes important to you and compare organizations you seek to support to other organizations with similar missions.
- 9.1.12.CFR.3 Research companies with corporate governance policies supporting the common good and human rights.
- 9.1.12.EG.5 Relate a country's economic system of production and consumption to building personal wealth, the mindset of social comparison, and

achieving societal responsibilities.

- 9.4.12.CI.1 Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12 prof.CR3a).
- 9.4.12.CT.4 Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that contribute to effective outcomes.
- 9.4.12.IML.5 Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2).
- 9.4.12.IML.6 Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).
- 9.4.12.IML.7 Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).

Social-Emotional Learning Competencies

- **Self Management:** Understand and practice strategies for managing one's own emotions, thoughts, and behaviors.
- **Responsible Decision Making:** Develop, implement, and model effective problem-solving and critical thinking skills.
- **Social Awareness:** Demonstrate an awareness of the differences among individuals, groups, and others' cultures.

Learning Targets	Investigations/Resources	Formative Assessment
Evaluate the social, economical, and environmental costs and benefits of various energy sources.	Renewable and Non-renewable • Different types • Scientific argumentation with cities • How we use energies • Electric cars	• Do-Nows or Exit Tickets • Question and answer/reflections • Group/individual discussion
Develop a model to demonstrate how carbon cycles through the 4 spheres.	Carbon Cycle Gizmo Carbon Cycle Dice Game	• Do-Nows or Exit Tickets • Question and answer/reflections • Group/individual discussion
Develop a model to demonstrate the effect of greenhouse gases on climate.	PHet Colorado Simulation shows how all of the greenhouse gases work together in the atmosphere and how their concentrations are changing.	• Do-Nows or Exit Tickets • Question and answer/reflections • Group/individual discussion
Analyze data in order to determine the factors that impact the climate of different areas.	Climate factors • Factor station lab (6 stations that help to analyze the factors that impact climate)	• Do-Nows or Exit Tickets • Question and answer/reflections • Group/individual discussion

	▪ Using the following factors to drive the stations: Ocean circulation, atmospheric circulation, latitude, elevation, albedo, topography, near water. ▪ Conduction, convection, radiation heat transfer lab.	
Analyze historical data to identify patterns and trends in carbon dioxide level and temperature.	Climate Change • Penguin activity • Indicators/Consequences of Climate Change • Ocean Acidification Lab: Indicator solution with breathing (red cabbage) and ocean acidification model	• Do-Nows or Exit Tickets • Question and answer/reflections • Group/individual discussion Develop and use a model for Penguin Activity
Design a solution to our world wide climate change situation using a cost/benefit analysis.	• Wedges Activity (Princeton)	• Do-Nows or Exit Tickets • Question and answer/reflections • Group/individual discussion
Honors--Will include all of the above, as well as targeted current event readings and data analysis. Honors: Construct explanations for phenomena regarding loss of biodiversity due to climate change. Honors: Develop a model showing how ocean acidification occurs and how it affects the biodiversity of marine life.		

Instructional Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504) When Appropriate

- Individual accommodations and modifications in students' IEP and 504's will be followed and adhered to.
- Activities in this unit will be designed to allow the struggling learners to scaffold their learning and develop skills for working on larger activities by breaking down tasks. All students will be given opportunities to use different learning modalities to advance their understanding using varied strategies

that accentuate their own learning style. Gifted learners will have the opportunity to challenge their problem solving skills by asking more complex questions and exploring concepts in greater depth.	
Common Assessment(s)	**Assessment Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504) When Appropriate**
• Greenhouse Effect PhET Activity • "Penguin Activity" Now You "Sea" Ice, Now You Don't	• All assessments will be modified in accordance with specifications from CST as enumerated in each student's individual educational plans and 504s. This may include, but is not limited to, extra time, clarification of questions, reading questions aloud, word banks, oral responses and alternate testing sites.

Hillsborough Township Public Schools
Environmental Science CP/H Curriculum

Unit Title	**Time Frame/Pacing**
Developing Sustainable Solutions	25 days

Phenomena/Anchoring Activity/Anchoring Question/Essential Questions

- What role as humans do we play in maintaining sustainability?
- What human actions can promote sustainability?

Anchoring Activity:

- Evaluate the current impact on the environmental systems in order to design a sustainable solution that will reduce the current impact on the multiple spheres of Earth.

Phenomena:

- Individual project theme based

Enduring Understandings

- Humans impact the environment in many different ways.
- Human impact can be global and local.
- Fixing human impact can be extremely difficult, but it needs to be done to ensure a safe, happy, and healthy future.

NJ Standards/NGSS Performance Expectations Taught and Assessed
Students who demonstrate understanding can:

- HS-LS4-6 Create or revise a simulation to mitigate adverse impacts of human activity on biodiversity.
- HS-ESS3-1: Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and [changes in] climate change have influenced human activity.
- HS-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
- HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.
- HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

3-Dimensional Learning Components

Science and Engineering Practices	**Disciplinary Core Ideas (DCI)**	**Crosscutting Concepts**

Constructing Explanations and Designing Solutions • Design or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ESS3-4) **Engaging in Argumentation from Evidence** • Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations). (HS-ESS3-2)	**ESS3.A: Natural Resources** • Resource availability has guided the development of human society. (HS-ESS3-1) • All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors. (HS-ESS3-2) **ESS3.C: Human Impacts on Earth Systems** • The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. (HS-ESS3-3) • Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. (HS-ESS3-4) **ETS1.B: Developing Possible Solutions** • When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (HS-ETS1-3) • Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is	**Cause and Effect** • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS4-2), (HS-LS4-4), (HS-LS4-5), (HS-LS4-6) **Systems and System Models** • When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models. (HS-ESS3-6) **Stability and Change** • Feedback (negative or positive) can stabilize or destabilize a system. (HS-ESS3-4) • Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. (HS-ESS3-3)

	most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs. (HS-ETS1-4)	

Interdisciplinary Connections: Math, ELA, and Computer Science and Design Thinking

Math

- MP.2 Reason abstractly and quantitatively. (HS-ESS3-6)
- MP.4 Model with mathematics. (HS-ESS3-6)
- HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-ESS3-6)
- HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-ESS3-6)
- HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-ESS3-6)

ELA

- RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. (HS-LS2-5)

Computer Science and Design Thinking

- 8.2.12.EC.1 Analyze controversial technological issues and determine the degree to which individuals, businesses, and governments have an ethical role in decisions that are made.
- 8.2.12.EC.2 Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded.
- 8.2.12.EC.3 Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.
- 8.2.12.ETW.4 Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints

Career Readiness, Life Literacies, and Key Skills

- 9.4.12.CT.1 Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
- 9.4.12.CT.2 Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
- 9.4.12.CT.3 Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
- 9.4.12.GCA.1 Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g.,

political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).

Social-Emotional Learning Competencies

- **Responsible Decision Making:** Develop, implement, and model effective problem-solving and critical thinking skills; Identify the consequences associated with one's actions in order to make constructive choices; Evaluate personal, ethical, safety, and civic impact of decisions.

Learning Targets	Investigations/Resources	Formative Assessment
• Design or modify a sustainable solution that will reduce the current impact of an existing product or scenario on a specific ecosystem. • Develop long-term predictions of solution's impact on sustainability in ecosystems. • Research and design multiple proposed solutions using evidence gathered from research for a new or improved technology that will reduce the ecological footprint for a given scenario. • Evaluate both the positive/negative social and economic impacts of natural resource use and availability for proposed solutions. • Collect and analyze data to argue which human impacts are negative for a provided product or scenario.	• Problem Based Sustainability Project ○ Research ○ Cost/Benefit Analysis ○ Prototype	Do-Nows or Exit Tickets Question and answer/reflections Group/individual discussion Project Check-ins Self Progress Checks
Honors: Content will include readings from news and publications regarding international sustainability issues as a basis for the development of this unit's prototype project.		

Instructional Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504) When Appropriate

- Individual accommodations and modifications in students' IEP and 504's will be followed and adhered to. Along with this:

• Activities in this unit will be designed to allow the struggling learners to scaffold their learning and develop skills for working on larger activities by breaking down tasks. All students will be given opportunities to use different learning modalities to advance their understanding using varied strategies that accentuate their own learning style. Gifted learners will have the opportunity to challenge their problem solving skills by asking more complex questions and exploring concepts in greater depth.	
Common Assessment(s)	**Assessment Modifications and/or Accommodations (ELL, Special Education, Gifted, At-Risk of Failure, 504)**
• Sustainability Project	• Individual accommodations and modifications in students' IEP and 504's will be followed and adhered to. Along with this: ○ Assistance will be provided in breaking tasks down ○ Modeling of expectations provided